

724-04: IMPLEMENTATION: RHODE ISLAND DROUGHT MANAGEMENT PLAN

04-01 Response Framework

Rhode Island's framework for anticipating, monitoring, and mobilizing in response to drought seeks to coordinate and organize the efforts of key agencies and organizations having management responsibilities, important data, and/or representation of important interests affected by drought. The R.I. Water Resources Board (WRB) which is charged with broad responsibilities for the management of the state's water resources, will assume a primary role in anticipating and facilitating the statewide response to drought events.

During normal conditions, the WRB is responsible for gathering and reviewing reports on conditions from the United States Geological Survey (USGS), the National Weather Service (NWS), the RI Department of Environmental Management and other experts as appropriate. When dry conditions persist and drought appears evident, the WRB shall convene a Drought Steering Committee to provide for expert advice and multi-disciplinary input to assist the Board in shaping a coordinated state response to the drought situation and advising the Governor on setting the phases of drought for the state.

The WRB will coordinate public communication and education efforts, as advised by this committee, and will assemble and coordinate the efforts of state and federal agencies, organizations, local officials and suppliers. Specific responsibilities of the Water Resources Board for the implementation of this *Drought Management Plan* are as follows:

- Maintain a list of committee members and contact information
- Convene the Drought Steering Committee when conditions warrant, and provide secretariat support (agendas, facilitation, minutes, etc)
- Collect, correlate, and disseminate data on the status of the drought
- Publish a monthly current conditions report that summarizes current water resource and weather conditions
- Communicate the Drought Steering Committee's recommendations to all audiences and coordinate communications between government agencies, water suppliers and the general public
- Appraise the Drought Steering Committee of agency, local, and public responses
- Forward recommendations to appropriate entities
- Recommend, as advised by the Drought Steering Committee, to the Governor:
 - Declaring phases of drought
 - Declaring local, regional, or statewide emergencies
 - Developing and coordinating emergency actions
- Advise all parties of gubernatorial actions and/or directives

04-02 Drought Steering Committee

An advisory Drought Steering Committee shall be convened by the WRB to provide technical expertise and advice to the WRB on monitoring, coordinating, and managing the state's response to drought situations. The Drought Steering Committee will assist in facilitating coordinated actions and communications related to drought conditions. The Committee will make recommendations to the WRB concerning drought levels and mitigation measures to assist the WRB in advising the Governor, local officials and other appropriate entities on actions needed to minimize drought impacts upon public health, safety and the environmental resources of the state. The primary responsibilities of the Drought Steering Committee include:

- Reviewing information gathered by the WRB to assess the impact of dry conditions
- Recommending drought phases and appropriate responses to drought-related impacts

Committee Membership

The Drought Steering Committee shall consist of representatives from agencies that have responsibility for functions related to water resources and/or interests likely to be affected by drought conditions. It shall also include agencies that manage data necessary for assessing the severity of drought conditions. The WRB shall maintain an up-to-date list of Drought Steering Committee members and contact information. The committee members will advise their respective agencies or constituencies on necessary actions. Committee membership shall consist of, but not be limited to:

- Governor's Office
- Department of Environmental Management
- Emergency Management Agency
- Civil Preparedness Advisory Committee
- Rhode Island National Guard
- Department of Administration
- Department of Health
- State Planning Council
- Public Utilities Commission,
- Providence Water Supply Board
- Rhode Island League of Cities and Towns
- National Weather Service
- Rhode Island Water Works Association
- Rhode Island Agricultural-Council
- Rhode Island Rivers Council
- Rhode Island Senate
- Rhode Island House of Representatives

- Rhode Island Economic Development Corporation
- United States Environmental Protection Agency-Region 1
- United States Department of Agriculture-Natural Resources Conservation Service
- United States Geological Survey
- Audubon Society of Rhode Island
- Representatives of large & small public water systems
- Other interested parties as designated by the WRB

The director or chief executive officer of each of these agencies/organizations will be invited to be a member and may designate appropriate staff representatives to attend Committee meetings. The Chair of the Water Resources Board shall serve as Chair of the Drought Steering Committee. When drought conditions appear imminent, the WRB will convene the Drought Steering Committee to meet on a regular basis throughout a long-term drought to review data and make recommendations.

04-03 State and Local Roles

This section summarizes the general authorities and outlines the anticipated roles of key state and local agencies and organizations in managing drought events in Rhode Island. Please note that for all the following agencies their water management responsibilities take on heightened importance and priority during extended drought. Figure 724-(3), Rhode Island Drought Management Process, page 4-11 is a flow chart illustrating the drought management process.

04-03-01 Water Resources Board (WRB)

The Water Resources Board is charged by *Rhode Island General Laws 46-15* with broad duties to regulate the proper development, protection, conservation and use of the water resources of the state. The Board is delegated a number of specific responsibilities concerning water resources management, including water supply development, promoting the planning, development, and conservation of water supplies, and reviewing requests for new water supplies by major suppliers. In addition, it is responsible for developing both an inventory of the water resources of the state and an allocation program for water users and the quantity being used. The WRB also establishes regulations governing water supply system management planning and reviews and approves all water system supply management plans (WSSMPs). Large public water suppliers are expected to address droughts by following the emergency response actions prescribed in their WSSMP.

Emergency Water Systems Interconnection Program

The WRB manages an Emergency Water Systems Interconnection Program to promote emergency connections between large public water systems throughout the state for use during the time of water shortages and supply emergencies. This program is funded through general obligation bonds. It reimburses twenty-five percent of the cost of installation of an emergency interconnection between a single system, and fifty

percent of the cost of a connection benefiting two or more systems. During a long-term drought, these interconnections will be vitally important. Depending upon the impacts of a drought on local/regional supplies, they may be instrumental in transferring water from areas that have surplus water to areas of need based upon the pre-established emergency supply agreements between the suppliers. Where such agreements do not exist, emergency declarations by the affected communities and the Governor may be necessary to activate their use. Water suppliers are expected to address droughts by maintaining updated emergency supply agreements through the WSSMP process. The status of the existing interconnections is included in Appendix C, Water Resources Board Emergency Interconnection Program.

04-03-02 Office of the Governor

Rhode Island General Law 46-15-14 authorizes the Governor to declare a water emergency, in all or in a part of the state in situations in which “water supplies are insufficient to meet the needs of the inhabitants of the state either through a water shortage or contamination of water supplies.” In a water emergency, the Governor may take such actions and issue such orders as may be necessary to implement the plan, including the imposition of conservation measures and the allocation of water supplies. RIGL 30-15-7 assigns the Governor the responsibility to prepare a comprehensive response plan for disasters and gives emergency management power to implement the response plan. This section also gives the Governor the authority to declare a state of emergency if a disaster has occurred or is imminent. Drought is included in the definition of “disaster”.

A proclamation of a state of emergency provides the Governor with expansive power, authority and discretion to address and resolve the declared emergency. In a water emergency, the Governor may take such actions and issue orders as necessary including imposing conservation measures and the allocation of water supplies. The actions and orders may be directed to state agencies, municipalities or entities engaged in the sale of water to the public. Once declared, a state of emergency may last only thirty days unless renewed.

04-03-03 Department of Environmental Management (DEM)

The Department of Environmental Management includes several units having specific responsibilities and/or resources related to the state’s drought response:

Division of Agriculture

The responsibilities of the division include a broad range of agriculture-related functions, organized within five primary program areas: animal health, mosquito abatement, pesticides, farmland ecology, and plant industry sales. The staff of the Farmland Ecology Unit works with, and regulates, farmers to ensure that agricultural activities do not negatively impact the state’s valuable wetland and groundwater resources. The division is responsible for coordinating with the Governor to declare a disaster or take other steps necessary based on either actual or predicted drought impacts to agricultural products. This declaration is often made in anticipation of crop

failures so that the state will be eligible to receive federal disaster assistance from the United States Department of Agriculture. Federal funding sources for drought assistance to agricultural interests are included in Appendix D, Federal Funding Assistance. The Division of Agriculture will also seek state financial assistance as necessary. The division has developed an agency response plan to reduce drought impacts on the agricultural community/industry. (See Appendix E, DEM Drought Response Plan for Agriculture.) The DEM plan is considered part of this plan in its entirety and part of the state response to drought management.

Office of Water Resources

The Office of Water Resources implements a variety of programs aimed at protecting and restoring the state's surface waters, groundwater and wetlands. The Office of Water Resources' programs play a pivotal role in controlling wastewater discharges, promoting non-point source abatement, preventing groundwater pollution and averting alterations to freshwater wetlands. The office is also responsible for regulating individual septic systems, underground injection control, groundwater certification, private well installation, water quality certification, the Rhode Island Pollution Discharge Elimination System and wastewater facility treatment permitting. The private well installation program regulates the location, design and installation of private drinking water wells. It also provides for registering of well drillers and pump installers and maintains a current list of companies and/or individuals who are properly registered. Rules stipulate the design and construction requirements for drilling new wells or improving old wells. Permits are not necessary but drillers are required to adhere to the standards. Records of well installations including size, location, geology, depth and yield are maintained. The office estimates that there are approximately five hundred to one thousand private drinking water wells installed annually in Rhode Island.

Division of Forest Environment

The Forest Environment Division manages 40,000 acres of state-owned rural forestland. It coordinates a statewide forest fire protection plan, provides forest fire protection on state lands, assists rural volunteer fire departments, and develops forest and wildlife management plans for private landowners. The division promotes public understanding of environmental conservation, enforces Department rules and regulations on DEM lands, and assists the federal government in providing landowner assistance programs. Risk of fires in wild land, rural areas, state forests and parks are linked to dry conditions. Assessment of fire risk and management of fire control resources is an on-going activity of the Division of Forest Environment. The division is responsible for managing state fire suppression resources and coordinating with other local, state, federal agencies and other states to obtain the appropriate resources.

Division of Fish and Wildlife

The Division of Fish and Wildlife protects, restores, and manages the fish and wildlife resources of the state. The division is responsible for operating and managing twenty-four wildlife management areas totaling over 46,000 acres and also operates more than one hundred boat launching ramps and shore fishing areas located through the state. The division is responsible for setting seasons, size limits, methods of taking, and daily limits for the harvest of all wildlife as well as all recreational and commercial fisheries in the state. It is divided into three separate sections: Marine Fisheries, Freshwater Fisheries, and Wildlife Management. Each section is responsible for specific program activities. These activities include fisheries and wildlife research and management, freshwater fish hatcheries and fish stocking programs, habitat restoration, public access, land acquisition, education and information, public angling and hunting programs, and commercial fisheries management. Dry conditions can lead to a range of impacts to fisheries and wildlife, from reducing food sources to fish kills or displacement of certain populations of animals. Department responsibilities include responding to incidents of wildlife entering residential or urban areas. They also include identifying impacts to specific fisheries and wildlife populations and recommending measures to reduce the impacts to these resources.

04-03-04 Emergency Management Agency (EMA)

The Emergency Management Agency is charged with protecting life and property in the event of a disaster or crisis situation. The EMA provides assistance to communities to protect the health and safety of their residents. During a drought and other types of water shortages, the agency may assist communities in locating alternative water supplies and in providing water (distributing emergency supplies) to their residents. The EMA coordinates the acquisition and transport of trucked water, large amounts of bottled water, or other equipment and supplies needed for emergency response. The agency may seek assistance through the RI National Guard, Federal Emergency Management Agency, Army Corps of Engineers, or the Emergency Management Assistance Compact if the water emergency is beyond the ability of the state to alleviate. The EMA may also assist communities in declaring a state of emergency.

04-03-05 Department of Health (DOH)

Rhode Island General Law 46-13 charges the Department of Health with preventing disease and protecting and promoting the health and safety of the people of Rhode Island. The Division of Environmental Health, Office of Drinking Water Quality is responsible for ensuring the quality of the state's public drinking water supplies. The Office of Drinking Water Quality works closely with local water suppliers, other state and federal programs, and various divisions within the DOH to ensure the safety of the state's drinking water. The office regulates the construction and operation of all public water systems and sources and assures the safety of drinking water supplies through monitoring requirements.

04-03-06 Public Utility Commission (PUC)

The Public Utility Commission is a regulatory body whose mission is to ensure that safe, reliable, quality utility service is provided at a fair and reasonable cost. The Commission has the powers of a court of record, and is charged under *RIGL 39-1-27.6* with responsibility for implementing and enforcing standards of conduct and holding hearings and conducting investigations involving the rates of water utilities. The Commission consists of three members appointed by the Governor to six-year terms with the advice and consent of the Senate. There are seven PUC-regulated water utilities in the state: Providence Water Supply Board, Pawtucket Water Supply Board, Woonsocket Water Department, Newport Water Department, United Water of Rhode Island, Kent County Water Authority, and Prudence Island Utility Corporation.

The PUC has a provision for seeking drought-related rate adjustments for regulated utilities during a drought emergency. When public safety requires or when an emergency exists in the financial affairs of a public utility, which is not met immediately, or will interfere with the accommodations, convenience, and welfare of the people, the Commission may order emergency rate relief, which becomes effective immediately, on a temporary basis. Under the Rules of the Commission, it has discretion over whether to hold a public hearing on such a request; and, if it finds that delay may cause immediate or irreparable harm, may set conditions it deems reasonable for such relief.

Division of Public Utilities and Carriers

The Division of Public Utilities and Carriers is a unit of the PUC charged with the supervision and execution of all laws relating to public utilities and carriers and all regulations and orders of the commission governing the conduct and charges of public utilities. The division serves as the advocate for water customers served by the seven regulated water utilities. The division must be notified of any water restrictions within these (regulated) water systems. Regulated water suppliers must coordinate mandatory conservation regulations through the Division of Public Utilities and Carriers. The division also reviews the calculation of proposed rates to ensure they are properly designed and will enforce all directives arising from the PUC's decision on such a request. All other suppliers can impose mandatory conservation, including rate changes, without the division's or the PUC's approval.

04-03-07 Statewide Planning Program and State Planning Council

The Statewide Planning Program of the Department of Administration is charged by *Sections 42-11-10 and 12 of the General Laws* with preparing and maintaining plans for the physical, economic, and social development of the state; encouraging their implementation; and coordinating the actions of state, local and federal agencies and private individuals within the framework of the state's development goals and policies. A State Guide Plan is prepared and maintained by the program as a means for centralizing and integrating long-range goals, policies and plans with short-range project plans and implementing programs prepared on a decentralized basis by agencies responsible in each functional area. Pursuant to *RIGL Ch. 45-22.3*, Statewide Planning

is responsible for establishing guidelines and with coordinating state review and approval of community comprehensive plans which all Rhode Island municipalities are required to prepare and maintain.

The State Planning Council, a seventeen member body representing a range of interests, guides the staff in preparing plans and in coordinating planning and development activities of governmental agencies at all levels and the private sector. The Council approves all statements of goals and policies and all elements of the State Guide Plan. The Council has been designated the Metropolitan Planning Organization (MPO) for transportation planning purposes and, as such, adopts the two year program of transportation investments, the Transportation Improvement Program. As the Comprehensive Economic Development Committee for the state, the Council adopts an annual priority list of projects for consideration by the US Economic Development Administration. The State Planning Council also advises the Governor on strategic planning matters such as this drought plan, and is required to ensure that major project and program proposals are consistent with the State Guide Plan.

04-03-08 Water Suppliers

Individual water supply systems, specifically the twenty-nine major public supply systems subject to the provisions of the Water Supply Systems Management Plan Act, have primary responsibility for assuring continuity of supply to their customers and for taking actions to mitigate the effects of drought on the ability of their systems to meet essential needs. As described previously, the Act requires large public suppliers to prepare Water Supply Systems Management Plans (WSSMPs). Contingency plans for drought circumstances are a critical component of any water supply management program in order to establish what levels of dry or drought conditions are likely to cause a water supply emergency. They are also critical in defining actions that will be taken to prevent the emergency and/or respond should one occur. Major water suppliers are responsible for implementing appropriate conservation responses as necessary to conserve water and to activate the appropriate actions outlined under the emergency operations portion of their WSSMP. The Water Resources Board is responsible for overseeing the implementation of the WSSMP Act.

Because each water supplier may be affected differently by drought due to differences in sources of supplies, capacity, regional hydrology, demand, timing, and permitting requirements, it is essential that each supplier identify drought indicators or triggers, within its WSSMP in order to assess the status of water supplies. The drought indicators for a particular water supply system will depend upon the specific conditions of the system, such as the capacity of storage and treatment facilities, storage tank elevation, reservoir storage, stream flows, groundwater levels, and precipitation. They will also depend upon the location and sensitivity of environmental resources. Drought triggers in emergency operations portions of the WSSMPs act as benchmarks that will provide warnings of impending water shortages. The purpose of developing triggers is to link the triggers with specific response actions for dry conditions and to mitigate drought impacts. A key response action for suppliers will be to restrict water use. Water use restrictions should move from limited and voluntary to more extensive mandatory restrictions depending upon the phase of drought. The development of clear triggers

and responses for suppliers within the WSSMPs will provide communities and water users predictable responses to dry conditions and droughts.

It is important for all water suppliers regardless of size to have access to contingency water supplies. All suppliers should establish connections to other nearby public suppliers where possible, identify emergency sources of water, and have in place up to date contingency contracts for the purchase of emergency supplies and/or distribution processes (e.g., bottled water or water tanker truck). All suppliers should identify non-potable water sources that can be used for fire protection and/or for other non-potable purposes. By having these contingencies in place prior to the onset of drought, water suppliers can ensure that they can protect the public health and safety during droughts.

04-03-09 Local Governments

Local governments, water suppliers and Indian tribes share the primary responsibilities for the management of their local systems and for ensuring that they can provide sufficient water to meet public health and safety needs of their communities and customers. Based upon local water supply conditions, municipalities may initiate their own actions ranging from voluntary water use restrictions to declarations of local water emergencies.

Information-sharing between state and local officials is essential in assessing drought situations. The local water entities must provide the specific information about their districts for state agencies to assess the broader situation faced by a region. Similarly, state drought levels and information to water suppliers should prompt action by local communities.

Municipal governments have the lead role in preparing for and managing all stages of drought at the community level. Drought preparedness measures include assuring plans for drought in Water System Supply Management Plans and local emergency plans, as well as coordinating with adjacent municipalities and their water suppliers to ensure emergency interconnections. Local governments should establish municipal policies to promote water conservation wherever possible. Municipalities, particularly those which experience chronic water shortages, should develop local ordinances to ensure that regulations and procedures are in place to anticipate and respond to drought conditions.

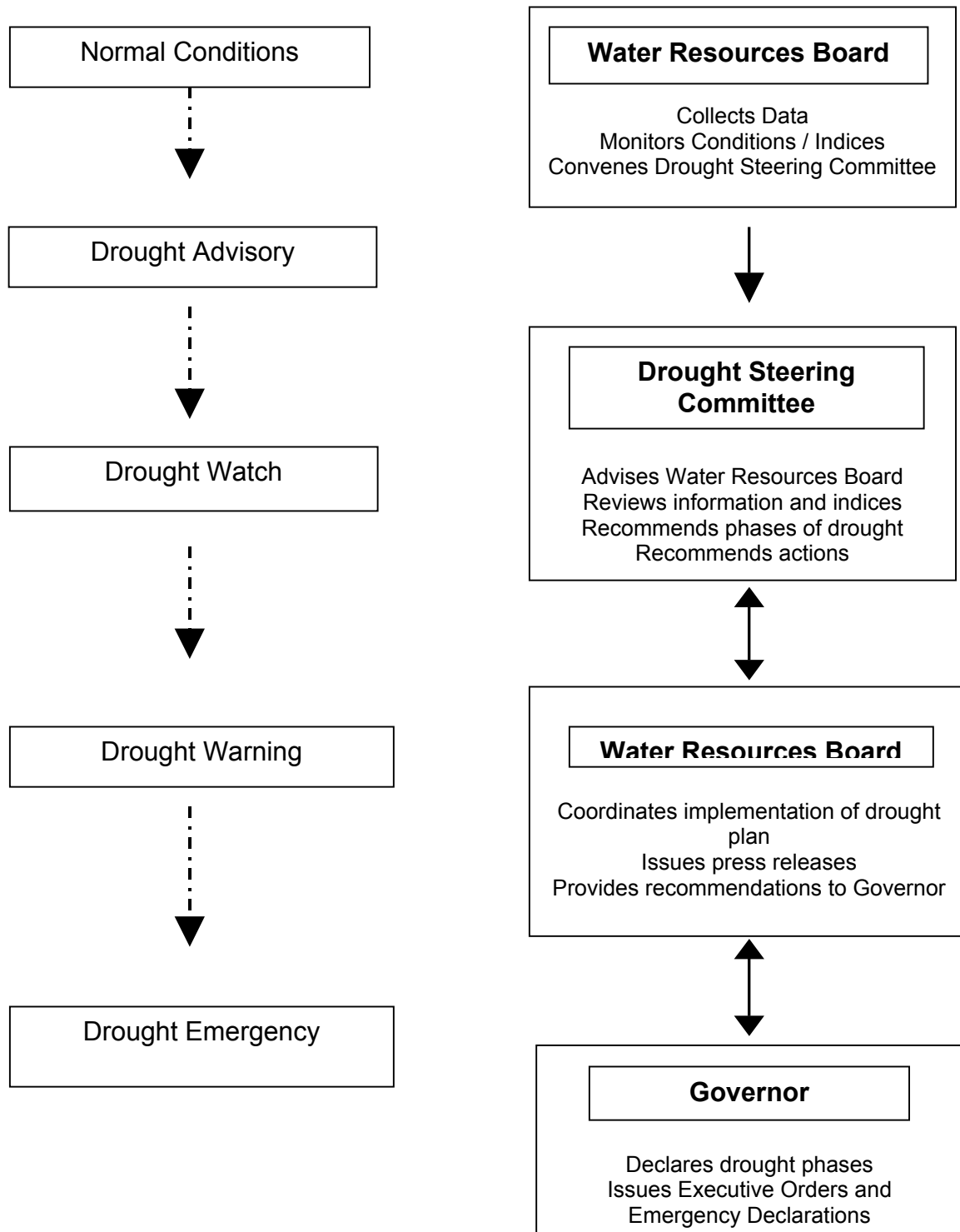
Emergency powers are conferred upon the chief elected municipal officer pursuant to *Rhode Island General Laws, 30-15-12*. This state law and individual municipal charter confer the authority to the municipality to plan for and declare an emergency on the municipal level. Municipal emergencies have a time limit of seven days, unless renewed.

The local government's most visible roles in the community may be in public education on the drought status and in the development and enforcement of local regulations as the situation worsens. However, not all restrictions may be ordered by local government. It should be noted that, in some cases, municipal governments have little control over water supply districts. However, it is local government that will be responsible for enforcing water restrictions at the community level.

04-03-10 Other Local Organizations

Local conservation groups and watershed councils can assist in efforts to encourage efficient water use in normal times and during drought conditions. They can serve as outreach agents to educate the public on the impacts of drought to natural resources and to coordinate and deliver information on water conservation. In addition, local watershed associations can work to assure that the minimum stream flows necessary for supporting healthy and naturally diverse populations of flora and fauna are maintained. They can serve as another important local source of information about water quality and quantity during drought conditions.

Figure 724-(3)
Rhode Island Drought Management Process



04-04 Anticipating Drought

04-04-01 Data Collection and Monitoring

Monitoring meteorological trends and other climatic information is vital to making timely and accurate decisions on drought management. When persistent dry conditions occur, the WRB shall assemble drought-related information for the Drought Steering Committee. Two key federal agencies that monitor important drought related information on an on-going basis are the U. S. Geological Survey (USGS) and the National Weather Service (NWS). The USGS monitors groundwater and surface water levels at several locations throughout the state and analyzes current water resource conditions compared to historical records. The NWS tracks current precipitation data for Rhode Island and maintains information of historical averages and records for precipitation. The NWS also provides short and long-term weather forecasts, as well as the Palmer Drought Index (See Section 04-05-01, Drought Indices and Phases).

Other sources for precipitation data include the University of Rhode Island and local news station meteorologists. Individual water suppliers and local governments can also provide valuable data on the status of local water supplies and drought conditions. A description of the data collection responsibilities for each agency is provided in Table 724-(2) below.

Table 724-(2)
Drought Related Information Collection

Information	Agency
Ground water levels, surface water levels, and stream flow conditions Surface water flows for rivers receiving major RIPDES discharges	United States Geological Survey Water Resources Board Department of Environmental Management
Extended weather forecast (3-month intervals) Summary of historical comparisons	National Weather Service, Local news stations, University of Rhode Island
Precipitation data	National Weather Service University of Rhode Island
Wells both static and pumping levels	Water Suppliers Water Resources Board
Suppliers with restrictions and water emergencies	Water Resources Board
Scituate Reservoir level	Providence Water Supply Board
Levels of other major reservoirs	Water Resources Board
Forest fire conditions and fire danger levels	Department of Environmental Management State Fire Marshal's Office
Crop, soil, and agriculture conditions	Department of Environmental Management United States Department of Agriculture RI Agricultural Council
Regulated utility issues	Division of Public Utilities and Carriers Public Utilities Commission
Public health and drinking water quality issues	Department of Health
Drought indices	Water Resources Board
Impacts to ecosystems, flora, and fauna	Department of Environmental Management Designated Watershed Associations

04-04-02 Drought Indices and Phases

Drought Phases

The drought indices and drought phases of this Plan have been adopted after considering national indices from the National Drought Mitigation Center and the National Weather Service and reviewing historic precipitation patterns and historical drought events in Rhode Island. The indices chosen are designed to anticipate drought conditions in order to begin early public education and outreach efforts on a statewide basis. The drought phases are also consistent with those used by the State of Massachusetts and are designed to coordinate with the WSSMPs of large public suppliers, particularly in the later and more severe phases of drought. Five drought phases are established for the Water Resources Board and the Drought Steering Committee to describe drought conditions:

1. Normal
2. Advisory
3. Watch
4. Warning
5. Emergency

Drought Indices

The WRB shall work closely with water suppliers to identify and assess local indicators including but not limited to, source of supply, static groundwater levels, reservoir levels and other storage and capacity issues. This information will be collected by the WRB and used to help assess drought levels, taking into account the time of year and the severity of the drought event. The WRB will provide such information to the Drought Steering Committee as is necessary to assess conditions and to make recommendations to the Governor regarding drought phases for the state. The Drought Steering Committee shall make its recommendations on phases based on the supplier's information and the following hydrological indices gathered by the WRB:

- **Palmer Drought Index (PDI)** - available from the National Weather Service or the National Climatic Data Center, this index reflects soil moisture and weather conditions including temperature.
- **Crop Moisture Index (CMI)** - available from the National Weather Service or the National Climatic Data Center, this index reflects short-term soil moisture conditions as used for agriculture. (The agricultural sector is usually the first to be affected because of its heavy dependence on stored soil water, which can be rapidly depleted in extended dry periods.)

- **Precipitation** - data is collected at eight data points and reported by county in Rhode Island. The data is evaluated relative to normal conditions in three, six, and twelve-month intervals by the National Weather Service to determine drought level. Additional sources of data may be available through other sources such as local news networks.
- **Stream flow** - condition maps showing areas of above-normal, normal, and below-normal are provided monthly by the USGS. A drought level determination is based on the number of months the stream flow levels are below normal (lowest 25% or period of record).
- **Ground water levels** - condition maps showing areas of above-normal, normal, and below-normal groundwater are provided monthly by the USGS. A drought level determination is based on the number of months the groundwater levels are below normal (lowest 25% or period of record).
- **Reservoir levels** - level data will be considered relative to normal conditions. The Water Resources Board, as part of its monthly conditions report, will maintain a list of water supply reservoirs and their percent of capacity. Drought phases will also be based on the water levels of small, medium, and large reservoirs across the state.

04-05 Setting Drought Phases

The Water Resources Board shall work with the National Weather Service, USGS, and water suppliers to correlate information for the Drought Steering Committee in order to prepare recommendations on drought phases for the Governor. Table 724-(3), Rhode Island Drought Indices and Phases, shows the thresholds for each of the indices by drought phase. To assign a drought phase, the Water Resources Board, as advised by the Drought Steering Committee, must determine that three of the four major hydrologic indicators have reached the designated threshold. The major hydrologic indicators are the Palmer Index (PDI), precipitation, stream flow and groundwater. However, it is important to note that time of year may influence the process considerably. In the fall and winter months, the Crop Moisture Index and PDI may react slowly but decline rapidly once the spring green-up occurs. The lag between surface water levels and groundwater levels could similarly skew the relative importance and number of indicators that are critical to determining the phase of drought. Finally, in the last two phases, groundwater and reservoir data particular to an area will also be used in conjunction with statewide data to determine drought phases. Local triggers developed by large water suppliers in WSSMPs shall be coordinated with the state drought phases by the Water Resources Board. The local WSSMPs' thresholds will also be used in conjunction with the statewide indices to help determine those regional areas that have entered the warning and emergency phases.

04-06 Drought Regions

The Water Resources Board, as advised by the Drought Steering Committee, will recommend drought phases statewide for the first three phases of drought, **Normal**, **Advisory** and **Watch** for the Governor to declare. The Water Resources Board, as advised by the Drought Steering Committee, will recommend drought phases by drought planning regions for the final two phases of drought, **Warning** and **Emergency** for the Governor to declare. The Governor shall declare the phase of drought for the state during a long-term drought. Figure 724-(4) Rhode Island Drought Regions shows the seven drought planning regions for the state. The seven regions are:

1. Northwest Region
2. Northeast Region
3. Central West Region
4. Central East Region
5. Southern Region
6. Eastern Region
7. New Shoreham Region

The regions are based upon a number of considerations, including existing water supply area boundaries, areas that are not served by large public water suppliers, precipitation differences, temperature variations, soils, municipal boundaries, and source of water supplies. The drought planning regions have been delineated to facilitate more focused monitoring of drought conditions and to differentiate areas of the state by basic water-related characteristics. For areas not served by major water suppliers and where the Water Resources Board will be conveying information to the general public through various media, Figure 724-4, Rhode Island Drought Regions, is an important reference.

Figure 724-(4) Rhode Island Drought Regions



Table 724-(3) Rhode Island Drought Indices and Phases

Drought Phase	Palmer Drought Index +	Crop Moisture Index	Precipitation +	Ground Water** +	Stream flow +	Reservoirs**
Normal	-1.0 to -1.99	0.0 to -1.0 Slightly Dry	1 month below normal	1 month below normal	2 consecutive months below normal	Reservoir levels at or near normal for the time of year
Advisory	-2.0 to -2.99	-1.0 to -1.9 Abnormally Dry	2 month cumulative below 65% of normal	At least 2 out of 3 months below normal	3 consecutive months below normal	Small index Reservoirs below normal
Watch	-3.0 to -3.99	-2.0 to -2.9 Excessively Dry	1 of the following criteria met: 3 month cum. < 65% or 6 month cum. < 70% or 12 month cum. < 70%	4-5 consecutive months below normal	At least 4 out of 5 consecutive months below normal	Medium index Reservoirs below normal
Warning	-4.0 and below	> -2.9 Severely Dry	2 out of 3 of the above criteria met: 3 month cum. < 65% and 6 month cum. <65% or 6 month cum. <65% and 12 month cum. <65% or 3 month cum. <65% and 12 month cum. <65%	6-7 consecutive months below normal observation wells recording monthly record lows	At least 6 out of 7 consecutive months below normal	Large index reservoirs below normal
Emergency	-4.0 and below	> -2.9 Severely dry	Same criteria as Warning and Previous month was Warning or Emergency	>7 months below normal observation wells recording monthly record lows	>7 months below normal	Continuation of previous month's conditions

+ Major hydrologic indicators.

****** Local triggers from the water system supply management plans will also be considered in assessing drought phases on a regional basis. The Water Resources Board will review local plans and work with suppliers to coordinate regarding drought phases and to collect, review and report surface reservoir and ground water data.

Normal is defined as the statistical average of the data for the period of record. Percentages for precipitation are relative to normal.

04-07 Communication

Effective drought response will be dependant upon effective communication of accurate, timely and consistent information on drought conditions and response actions to the public, major water users, and other targeted interests. One of the primary responsibilities of the Water Resources Board is to use the Drought Steering Committee to develop and disseminate clear and consistent information.

The Water Resources Board is primarily responsible for communicating the declarations of the Governor and the recommendations of the Drought Steering Committee to the public and targeted water users. Individual water suppliers are primarily responsible for communicating the decisions and recommendations of both the Governor and the Water Resources Board to their customers. Other agency members of the Drought Steering Committee will communicate the decisions and recommendations of the Drought Steering Committee to constituencies and interests they serve. Table 724-(4), Communication of Drought Steering Committee Recommendations, outlines the agencies and audiences for communication during the time of a drought.

Table 724-(4)
Communication of Drought Steering Committee Recommendations

Agency/Organization	Audience
Water Resources Board Governor's Office	General Public
Water Resources Board,	Local Government, Watershed Councils
Water Suppliers RI Water Works Association	Customers, Water Resources Board
Water Resources Board Department of Health	Water Suppliers
Department of Environmental Management	Foresters
Department of Environmental Management RI Agricultural Council	Farmers/Agricultural Interests
Water Resources Board Department of Environmental Management	Other Large Water Non-agricultural users e.g. Industrial, golf courses, etc.
Narragansett and Mashantucket Pequot Indian Tribes	Indian Tribes
Water Resources Board State Fire Marshal	Local Fire Departments
RI Economic Development Corporation Chambers of Commerce	Industries/Businesses

04-08 Rhode Island Drought Management Actions

This section describes the drought management actions for each of the five phases of drought. The process evolves from general information collection and sharing under normal or drought advisory conditions to preparation and declaration of an emergency situation by the Governor for drought emergencies. All response actions in early phases of drought will be continued in later phases of drought as needed. A given drought action phase can change in one of three ways:

1. If conditions worsen and reach the criteria for the next most severe drought phase, the drought severity level will be increased accordingly.
2. If conditions persist but do not reach the next phase, the drought phase will be held constant.
3. If conditions begin to improve the drought phase may be reduced.

In all cases, the Water Resources Board, as advised by the Drought Steering Committee, will recommend to the Governor whether conditions warrant a change in drought phase. Once the precipitation index triggers a drought phase of warning or emergency, conditions must improve beyond the previous level to reduce the drought phase. Table 724-(5) Rhode Island Drought Management Actions on the following pages lists the actions to be undertaken during the five phases of drought.

Table 724-(5) RHODE ISLAND DROUGHT MANAGEMENT ACTIONS

Drought Phase: Normal

1. WRB collects basic weather and hydrological data.
2. USGS monitors surface and groundwater levels.
3. WRB works with municipalities on drought related contingency plans and to adopt drought related ordinances.

Drought Phase: Drought Advisory

1. WRB communicates with public, municipalities and water suppliers about dry conditions.
2. WRB convenes Drought Steering Committee and recommends to the Governor to declare an advisory phase.
3. WRB develops press announcements as advised by the Drought Steering Committee.
4. WRB collects information and advises Drought Steering Committee on list of water restrictions.
5. WRB coordinates regular meetings of the Drought Steering Committee to review information and circulate educational materials.
6. WRB works with DEM and USGS in order to expand data collection and monitoring.
7. WRB forwards "Current Conditions" report to the Drought Steering Committee, general public, municipalities and major water suppliers.
8. WRB develops and recommends statewide voluntary conservation measures and begins public awareness campaign on water conservation.
9. WRB works with the DEM and USGS to measure stream flow and groundwater levels and to relay this data to farmers, golf courses, other water users and watershed councils in the affected watershed(s).
10. DEM-Agriculture mails listing of water conservation techniques to farmers, requests farmers to conserve, and initiates appropriate steps of the Drought Response Plan for Agriculture (See Appendix E).
11. WRB offers technical assistance to water suppliers to enhance efficiency of their major users

Drought Phase: Drought Watch

1. WRB distributes monthly Current Conditions Report to the Governor, Drought Steering Committee, major water suppliers, and municipalities.
2. WRB and the Drought Steering Committee recommend to the Governor to declare a watch phase.
3. WRB works with the Drought Steering Committee to develop and distribute clear and consistent public information regarding current conditions and general water conservation measures.
4. WRB offers technical assistance to municipalities on managing water use during dry conditions.
5. WRB works with state agencies to intensify monitoring and appraisal of drought situation.
6. WRB, as advised by the Drought Steering Committee, reports on status of the drought to the Governor, Senate and House leadership.
7. WRB works with state agencies to initiate contact and planning efforts with federal agencies.
8. WRB develops, recommends and encourages continued water conservation and use restrictions.
9. The WRB updates and distributes the statewide map reporting the drought status by region.
10. Large water systems follow triggers and actions from WSSMPs to determine their drought level.
11. DEM-Agriculture continues to implement response plan for agriculture.
12. When rivers approach their 7Q10 low flow (a standard used to measure stream flow), DEM requests voluntary reductions in the quantity of pollutants discharged from industrial sources.
13. WRB works with DEM-Agriculture to provide a list of water suppliers and water transporters willing to supply farmers.
14. WRB develops and distributes a list of well drillers.

*Drought Phase: **Drought Watch*** (continued)

15. DOH provides a list of private laboratories for water testing.
16. DOH expedites permitting and gives priority reviews to replace public wells that have gone dry, where practical.
17. Fire districts/departments identify alternative sources of water or call on a regional tanker force, when water bodies are low.
18. WRB, as advised by the Drought Steering Committee, encourages fire departments to distribute educational materials stating that dry conditions may cause problems for sprinkler systems.
19. DEM expedites dry hydrant permits for fire departments

*Drought Phase: **Drought Warning***

1. WRB, as advised by the Drought Steering Committee, recommends to the Governor to declare a warning phase and WRB works with all constituencies (the public, municipalities, suppliers, etc.) to implement measures to reduce water use.
2. WRB, as advised by the Drought Steering Committee, implements and promotes public information and provides technical assistance to conserve water and reduce water demand.
3. WRB, as advised by the Drought Steering Committee, intensifies media coverage and public education efforts.
4. WRB, works with local suppliers and updates statewide maps to report those regions that have entered the warning stage.
5. WRB, as advised by the Drought Steering Committee, adopts list of non-essential water uses and strongly recommends that water users cease all non-essential water uses.
6. WRB, reviews readiness and availability of emergency interconnections and sources of water.

*Drought Phase: **Drought Warning*** (continued)

7. DOH assesses public health threats and acts as needed.
8. WRB, initiates contact and planning with northeast states regarding regional conditions and responses.
9. WRB, works with the Governor's Office to declare a warning phase and to prepare a proclamation for the Governor in case of a drought emergency and develops a communications strategy.
10. WRB, informs the House and the Senate leadership about drought conditions.
11. WRB, as advised by the Drought Steering Committee, coordinates with RIEMA to investigate potential funding and assistance.
12. Individual water systems implement drought-response actions outlined in their WSSMPs.
13. DEM-Agriculture follows steps in the Drought Response Plan for Agriculture.
14. Regulated water suppliers may petition the Public Utilities Commission for emergency rate relief.
15. DEM and WRB identify adverse environmental impacts and advise the Drought Steering Committee regarding mitigation.

*Drought Phase: **Drought Emergency***

1. WRB, as advised by the Drought Steering Committee, recommends to the Governor to declare an emergency, and recommends to the Senate and House leadership on implementing emergency responses and mitigation measures.
2. The Governor may issue a proclamation of a drought emergency. The proclamation may stipulate mandatory bans on non-essential water use as recommended by the WRB. Water use restrictions shall be in accordance with WSSMPs for large water suppliers. More restrictive measures may be required according to the Governor's Emergency Proclamation.
3. WRB, as advised by the Drought Steering Committee, continues to coordinate the responses of state, local and federal agencies.
4. WRB, as advised by the Drought Steering Committee, coordinates with RIEMA to seek disaster declarations and secure emergency funding/assistance.

04-09 Non-Essential Water Uses

Water is a basic and essential need of every creature. It is a natural resource of tremendous value and important to every citizen of the state. Maintaining water supplies is essential to protect the public health, to support the economy of the state and to protect the environment. Yet water can be depleted quickly and used faster than it can be replenished during a long-term drought. An important drought mitigation measure for water suppliers and users is demand reduction. Demand reduction measures implemented for water shortages generally follow a logical progression from voluntary reductions in usage to mandatory reductions in usage, and, finally under severe water shortage conditions, to water rationing.

Large water suppliers will implement demand reduction strategies as outlined in their WSSMPs. The second two phases of this plan, advisory and watch, require voluntary water use reduction. During the warning phase the Water Resources Board, as advised by the Drought Steering Committee, shall recommend more stringent use reductions and, in the final severe emergency stage, provide the Governor with recommendations on bans for non-essential water uses.

The actual uses banned may depend upon the time of year of the drought emergency since many non-essential water uses are seasonal in nature and often are outdoor household or workplace water uses such as landscape and lawn watering. Water suppliers should promote water conservation practices as a part of normal operating procedures and early during developing drought conditions. Water users should be alerted to developing drought conditions, informed of actions required to respond to water shortages and updated as more severe conditions develop. An important aspect of implementing the demand reductions will be early notification to appropriate municipal officials and water suppliers of the non-essential water uses ban and the measures they must use to enforce them.

The Long-term Drought Management Task Force strongly recommended the following listing of non-essential water uses be used during the times of warnings and emergency drought phases.

**Table 724-(6) Non-essential Water Uses in
Rhode Island during Drought**

(Recommended by Long-term Drought Management Task Force, March 2002)

Note: To encourage use of treated wastewater as a conservation measure, water uses which employ treated wastewater or recycled water are exempted from this list.

1. Washing down any hard surface areas, including streets, gutters, sidewalks, walkways, driveways, parking lots, and tennis courts.
2. Washing down any building or structures other than for immediate fire protection.
3. Washing any vehicle including automobiles, motor bikes, boats, trailers, and airplanes.
4. Supplying water to any decorative water bodies, including all fountains and scenic and recreational ponds and lakes, except for the minimum necessary to support aquatic life.
5. Filling or maintaining the water level in private swimming pools.
6. Watering any lawns, plants, trees and other flora in daylight hours, with consideration to priority agricultural uses pursuant to *Rhode Island General Law 46-15.7-1(5) Management of the Withdrawal and Use of the Waters of the State*.
7. Obtaining water from hydrants for any purpose other than fire-fighting, including use of water for construction and hydrant testing.
8. Flushing of sewers.
9. Serving water in restaurants, except upon request.
10. Continuing water service to customers who have been issued a ten-day notice to repair one or more leaks and who have failed to comply.

04-10 Returning to Normal

The Water Resources Board, as advised by the Drought Steering Committee shall recommend any reductions in drought phases to the Governor. After return to normal conditions, the Water Resources Board will provide a post-drought evaluation report to the Governor and the Drought Steering Committee. The report shall describe lessons learned and problems experienced during the drought situation and may make recommendations for amendments to this plan.

In order to determine the end of a drought, the two key indices, precipitation and ground water levels, will be examined. These two indices have the greatest long-term impact on stream flow, water supply, reservoir levels, soil moisture and potential for forest fires.

A majority of the indices will not be considered because they will return to normal at some point during the year. For example, the Crop Moisture Index returns to normal at the end of the growing season. Precipitation is a key factor because it is the overall cause of improving conditions. The water table responds slowly to improving conditions and is a good indicator for monitoring the return to normal conditions. According to the National Drought Mitigation Center, when precipitation levels return to normal, surface and sub-surface supplies return to normal in the same sequence they were affected. Soil water reserves are replenished first, followed by stream flow, reservoirs and lakes, and then groundwater. The length of the recovery period is a function of the intensity of the drought, its duration and the quantity of precipitation received as the drought ends.

In order to ensure long-term improvement, the reduction of a drought level in any given region should be limited to no more than one reduction every two months. Generally, drought phases should only be revised to a less severe phase when normal conditions for both precipitation and groundwater have been reached for a sustained period of time, as set forth in Table 724-(7) Returning to Normal. (Please note that Table 724-(3) Rhode Island Drought Indices and Phases, establishes the baseline references). Due to the complexity of factors to be examined, the Board and Committee will rely heavily on the professional judgment of key members.

Precipitation from large storms such as hurricanes will need to be weighed based on the individual impact of the large storm. While these storms may return long-term precipitation totals to normal and may fill reservoirs, they often do little to replenish groundwater levels necessary for long-term water resource protection. The long-term cumulative precipitation deficits listed in Table 724-(7) can be changed to up to twelve months depending on the time of year and length of the drought. For example, the fall and spring months are ideal for groundwater recharge, and precipitation that occurs during the fall and spring can result in a quicker return to normal conditions.

**Table 724-(5)
Returning to Normal**

Current Drought Phase	Next Drought Phase	Reduce Drought Phase by one category
Emergency	Emergency-continued below normal conditions	Groundwater levels at or above normal and no precipitation deficit for past 3 months; and/or water resource problems which prompted the emergency have abated
Warning	Emergency-worsening conditions or continued below normal conditions	Two consecutive months of groundwater levels at or above normal and near normal precipitation for past 6 months
Watch	Warning-worsening conditions Watch continued below normal	Two consecutive months of groundwater levels at or above normal and near normal precipitation for past 6 months
Advisory	Watch-worsening conditions	Two consecutive months of groundwater levels at or above normal and near normal precipitation for past 3 months